

10/576906

AP20 Rec'd from PTO 21 APR 2006

PCT/AU2004/001440

-1-

SEQUENCE LISTING

<110> Melbourne Health
Southern Health
Austin Health
5 St. Vincent's Hospital (Melbourne) Ltd. trading as St. Vincent's
Hospital Melbourne
Bayside Health
BARTHOLOMEUSZ, Angeline, Ingrid (US Only)
10 LOCARNINI, Stephen, Alister (US Only)
AYRES, Anna (US Only)
YUEN, Lilly, Ka, Wai (US Only)
SASADEUSZ, Joseph, John (US Only)

15 <120> Viral Variants; Detection and Application

<130> 12510140/EJR

20 <150> AU2003905776
<151> 2003-10-21

<150> AU2004900962
<151> 2004-02-25

25 <160> 42

<170> PatentIn version 3.1

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<212> DNA
<213> hepatitis B virus

<400> 1

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Pro Phe Leu Leu Val Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg
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10 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val
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15 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Tyr Thr Ala Ile
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20 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Asn Lys Thr
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45 Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Ala Pro Thr Cys
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50 Pro Gly Gln Asn Leu Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser
 50 55 60

55 Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe
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15	Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp			
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20	Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Val Arg			
	145	150	155	160
25	Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Phe Ser Leu Leu			
	165	170	175	
30	Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu			
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35	Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Asn Ile			
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- 6 -

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Leu Leu Leu Tyr Gln Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His
 145 150 155 160

15 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser
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20 Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg
 180 185 190

25 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val
 195 200 205

Leu Gly Ala Lys Ser Val Ser His Leu Glu Ser Leu Phe Thr Ala Val
 210 215 220

30 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro His Lys Thr
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40 Tyr Gly Ser Leu Pro Gln Asp His Ile Arg Gln Lys
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 20 25 30

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 35 40 45

5 Leu Gly Gln Asn Ser Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser
 50 55 60

10 Cys Pro Pro Thr Cys Pro Gly Tyr Arg Trp Met Tyr Leu Arg Arg Phe
 65 70 75 80

15 Ile Ile Phe Leu Phe Ile Leu Leu Cys Leu Ile Phe Leu Leu Val
 85 90 95

20 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Ile Pro Gly
 100 105 110

25 Ser Ser Thr Thr Ser Thr Gly Pro Cys Arg Thr Cys Thr Thr Pro Ala
 115 120 125

30 Gln Gly Asn Ser Met Tyr Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp
 130 135 140

35 Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Gly Lys
 145 150 155 160

40 Phe Leu Trp Glu Trp Ala Ser Ala Arg Phe Ser Trp Leu Ser Leu Leu
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45 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu
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50 Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Arg Ile
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Tyr Ile
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55	Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp Phe Ser Gln						
	35	40	45				

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5 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu
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10 Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala
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15 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro Arg Tyr Val
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20 Ala Arg Leu Ser Ser Thr Ser Arg Asn Ile Asn Tyr Gln His Gly Thr
 115 120 125

25 Met Gln Asp Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu
 130 135 140

30 Leu Leu Leu Tyr Lys Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His
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35 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser
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40 Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg
 180 185 190

45 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val
 195 200 205

50 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Phe Thr Ala Val
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55 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Thr Lys Thr
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55 Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Leu Ser Leu Leu	
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180

185

190

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Tyr Ile
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25	Phe Ser Arg Gly Ser Thr Arg Val Ser Trp Pro Lys Phe Ala Val Pro	
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30	Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu	
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	75	80
35	Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala	
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40	Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro Arg Tyr Val	
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55	Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser	
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55	Pro Phe Leu Leu Thr Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg	
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- 14 -

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	Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Xaa Leu Ser Leu Leu		
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25	Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Asn Ile		
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40	Phe Arg Asn Ser Lys Pro Cys Ser Asp Tyr Cys Leu Ser His Ile Val	
	35 40 45	
45	Asn Leu Leu Glu Asp Trp Gly Pro Cys Thr Glu Tyr Gly Glu His His	
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50	Ile Arg Ile Pro Arg Thr Pro Ala Arg Val Thr Gly Gly Val Phe Leu	
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55	Val Asp Lys Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp	
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60	Phe Ser Gln Phe Ser Arg Gly Ser Thr Arg Val Ser Trp Pro Lys Phe	
	100 105 110	

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 115 120 125

5 Ser Trp Leu Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu
 130 135 140

10 His Pro Ala Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro
 145 150 155 160

15 Arg Tyr Val Ala Arg Leu Ser Ser Thr Ser Arg Asn Ile Asn Tyr Gln
 165 170 175

20 His Gly Thr Met Gln Asp Leu His Asp Ser Cys Ser Arg Asn Leu Tyr
 180 185 190

Val Ser Leu Leu Leu Tyr Lys Thr Phe Gly Arg Lys Leu His Leu
 195 200 205

25 Tyr Ser His Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val
 210 215 220

30 Gly Leu Ser Pro Phe Leu Met Ala Gln Phe Thr Ser Ala Ile Cys Ser
 225 230 235 240

35 Val Val Arg Arg Ala Phe Pro His Cys Leu Val Phe Ser Tyr Val Asp
 245 250 255

40 Asp Val Val Leu Gly Ala Lys Ser Ala Gln His Leu Glu Ser Leu Phe
 260 265 270

Thr Ala Ile Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Xaa
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20								25						30	
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35								40						45	
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40 Gly Pro Leu Leu Val Leu Gln Ala Gly Phe Phe Leu Leu Thr Arg Ile

85								90						95	
----	--	--	--	--	--	--	--	----	--	--	--	--	--	----	--

45 Leu Thr Ile Pro Gln Ser Leu Asp Ser Trp Trp Thr Ser Leu Asn Phe

100								105						110	
-----	--	--	--	--	--	--	--	-----	--	--	--	--	--	-----	--

50 Leu Gly Gly Ala Pro Ala Cys Pro Gly Gln Asn Leu Gln Ser Pro Thr

115								120						125	
-----	--	--	--	--	--	--	--	-----	--	--	--	--	--	-----	--

55 Ser Asn His Ser Leu Thr Ser Cys Pro Pro Ile Cys Pro Gly Tyr Arg

130								135						140	
-----	--	--	--	--	--	--	--	-----	--	--	--	--	--	-----	--

60 Trp Met Cys Leu Arg Arg Phe Ile Ile Phe Leu Phe Ile Leu Leu Leu

145								150						155	
-----	--	--	--	--	--	--	--	-----	--	--	--	--	--	-----	--

65 Cys Leu Ile Phe Leu Leu Val Leu Leu Asp Tyr Gln Gly Met Leu Pro

165								170						175	
-----	--	--	--	--	--	--	--	-----	--	--	--	--	--	-----	--

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Val Cys Pro Leu Leu Pro Gly Thr Ser Thr Thr Ser Thr Gly Pro Cys
 180 185 190
 5

Lys Thr Cys Thr Thr Pro Ala Gln Gly Thr Ser Met Phe Pro Ser Cys
 195 200 205
 10

Cys Cys Thr Lys Pro Ser Asp Gly Asn Cys Thr Cys Ile Pro Ile Pro
 210 215 220

15 Ser Ser Trp Ala Phe Ala Arg Phe Leu Trp Glu Trp Ala Ser Val Arg
 225 230 235 240

20 Phe Ser Trp Leu Ser Leu Leu Val Pro Phe Val Gln Trp Phe Val Gly
 245 250 255

Leu Ser Pro Thr Val Trp Phe Ser Val Met Trp Met Met Trp Tyr Trp
 260 265 270
 25

Gly Pro Ser Leu His Asn Ile Leu Asn Pro Phe Leu Pro Leu Leu Pro
 275 280 285

30 Ile Phe Phe Cys Leu Trp Val Tyr Ile Xaa Thr Xaa Ile Lys Pro Asn
 290 295 300

35 Val Gly Ala
 305

40 <210> 16
 <211> 988
 <212> DNA
 <213> hepatitis B virus

45 <400> 16
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 50 ggggcctata ctttcctgtt ggtggctcca gtccggaaac agtaaaacct gttccgacta 180
 ctgcctctcc catatcgta atcttctcga ggactggggc ccctgcaccg aatatggaga 240
 gcaccacatc aggattccca ggacccctgc tcgtgttaca ggcggggttt ttcttgttga 300
 55 caagaatcct cacaatacca cagagtctag actcgtggtg gacttctctc aatttctag 360
 ggggagcacc cacgtgtctt ggccaaaatt tgcatcccc aacctccaaat cactcaccaa 420

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	cctcttgc tccaaattgt cctggttatc gctggatgtg tctgcggcgt tttatcatct	480
5	tccctttcat cctgctgcta tgcctcatct tcttgggt tcttcggac taccaggta	540
	tgttgcggc tttccctcta cttccaggaa catcaactac cagcaaggga ccatgcaaga	600
	cctgcacgac tctgctcaa ggaacctcta tgttccctc ttgttgctgt aaaaaacctr	660
10	cggacggaaa ttgcacttgt attcccatcc catcatctt ggcttcgca agattccat	720
	gggagtgggc ctcagtcgt ttctctggc tcagttact agtgcattt gttcagtggt	780
15	tcttagggct tccccccact gttggctt cagttatatg gatgatgtgg tattggggc	840
	caagtctgtt caacatctt aatcccttt taccgctgtt accaattttc tttgtcttt	900
	gggtatacat taaaacccta ctaaaactaa acgttgggc tactccctt acttcatgg	960
20	atatgttaatt ggaagtggg gtaccttg	988
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25	<211> 258	
	<212> PRT	
	<213> hepatitis B virus	
	<400> 17	
30	Glu Asp Trp Gly Pro Cys Thr Glu Tyr Gly Glu His His Ile Arg Ile	
	1 5 10 15	
35	Pro Arg Thr Pro Ala Arg Val Thr Gly Gly Val Phe Leu Val Asp Lys	
	20 25 30	
40	Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp Phe Ser Gln	
	35 40 45	
45	Phe Ser Arg Gly Ser Thr His Val Ser Trp Pro Lys Phe Ala Val Pro	
	50 55 60	
	Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu	
65	65 70 75 80	
50	Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala	
	85 90 95	
55	Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro Arg Tyr Val	
	100 105 110	

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Ala Arg Leu Ser Ser Thr Ser Arg Asn Ile Asn Tyr Gln His Gly Thr
 115 120 125

5 Met Gln Asp Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu
 130 135 140

10 Leu Leu Leu Tyr Lys Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His
 145 150 155 160

15 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser
 165 170 175

20 Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg
 180 185 190

Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val
 195 200 205

25 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Phe Thr Ala Val
 210 215 220

30 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Thr Lys Thr
 225 230 235 240

Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly Ser
 245 250 255

35 Trp Gly

40 <210> 18
 <211> 226
 <212> PRT
 <213> hepatitis B virus

45 <400> 18

50 Met Glu Ser Thr Thr Ser Gly Phe Leu Gly Pro Leu Leu Val Leu Gln
 1 5 10 15

Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu
 20 25 30

55 Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Ala Pro Thr Cys
 35 40 45

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Pro Gly Gln Asn Leu Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser
 50 55 60

Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe
 65 70 75 80

10 Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu Val
 85 90 95

15 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Leu Pro Gly
 100 105 110

20 Thr Ser Thr Ser Thr Gly Pro Cys Lys Thr Cys Thr Thr Pro Ala
 115 120 125

25 Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp
 130 135 140

Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Ala Arg
 145 150 155 160

30 Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Leu Ser Leu Leu
 165 170 175

35 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu
 180 185 190

40 Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Asn Ile
 195 200 205

45 Leu Asn Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val
 210 215 220

Tyr Ile
 225

50 <210> 19
 <211> 1043
 <212> DNA
 <213> hepatitis B virus

55 <400> 19
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- 22 -

- 23 -

Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asp Leu Ser Trp Leu
 65 70 75 80

Ser Leu Asp Val Ser Ala Ala Phe Tyr His Ile Pro Leu His Pro Ala
 85 90 95

10 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Ser Arg Tyr Val
 100 105 110

15 Ala Arg Leu Ser Ser Asn Ser Arg Ile Leu Asn His Gln His Gly Asn
 115 120 125

20 Met Pro Asn Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu
 130 135 140

25 Leu Leu Leu Tyr Gln Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His
 145 150 155 160

30 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser
 165 170 175

35 Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg
 180 185 190

40 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val
 195 200 205

45 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Phe Thr Ala Val
 210 215 220

Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Thr Pro Asn Lys Thr
 225 230 235 240

50 Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly Ser
 245 250 255

Tyr Gly

55 <210> 21
 <211> 226
 <212> PRT

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<213> hepatitis B virus

<400> 21

5	Met	Glu	Asn	Ile	Thr	Ser	Gly	Leu	Leu	Gly	Pro	Leu	Leu	Val	Leu	Gln
	1			5				10						15		
10	Ala	Gly	Phe	Phe	Leu	Leu	Thr	Arg	Ile	Leu	Thr	Ile	Pro	Gln	Ser	Leu
					20				25					30		
15	Asp	Ser	Trp	Trp	Thr	Ser	Leu	Ser	Phe	Leu	Gly	Gly	Thr	Thr	Val	Cys
					35				40				45			
20	Leu	Gly	Gln	Asn	Ser	Arg	Ser	Pro	Thr	Ser	Asn	His	Ser	Pro	Thr	Ser
					50			55			60					
25	Ile	Ile	Phe	Leu	Phe	Ile	Leu	Leu	Leu	Cys	Leu	Ile	Phe	Leu	Leu	Val
					85			90			95					
30	Leu	Leu	Asp	Tyr	Gln	Gly	Met	Leu	Pro	Val	Cys	Pro	Leu	Ile	Pro	Gly
					100			105			110					
35	Ser	Ser	Thr	Thr	Ser	Thr	Gly	Thr	Cys	Arg	Thr	Cys	Thr	Thr	Pro	Ala
					115			120			125					
40	Gln	Gly	Thr	Ser	Met	Tyr	Pro	Ser	Cys	Cys	Cys	Thr	Lys	Pro	Ser	Asp
					130			135			140					
45	Gly	Asn	Cys	Thr	Cys	Ile	Pro	Ile	Pro	Ser	Ser	Trp	Ala	Phe	Gly	Lys
					145			150			155			160		
50	Phe	Leu	Trp	Glu	Trp	Ala	Ser	Ala	Arg	Phe	Ser	Trp	Leu	Ser	Leu	Leu
					165			170			175					
55	Val	Pro	Phe	Val	Gln	Trp	Phe	Val	Gly	Leu	Ser	Pro	Thr	Val	Trp	Leu
					180			185			190					
	Ser	Val	Ile	Trp	Met	Met	Trp	Tyr	Trp	Gly	Pro	Ser	Leu	Tyr	Ser	Ile
					195			200			205					
	Leu	Ser	Pro	Phe	Leu	Pro	Leu	Leu	Pro	Ile	Phe	Phe	Cys	Leu	Trp	Val

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210

215

220

5 Tyr Ile
 225

10 <210> 22
 <211> 1027
 <212> DNA
 <213> hepatitis B virus

15 <400> 22
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 tgagagacac tcatacctcag gccgtgcagt ggaactccac aacccctccac caaactctgc
 aagatcccag agtgagagggc ctgtatttcc ctgctgggtgg ctccaggattca ggaacagtaa 120
 accctgttcc gaccactgcc tctcccttat cgtcaatctt ctcgaggatt ggggaccctg 180
 cgctgaacat ggagaacatc acatcaggat tccttaggacc ctttctcggt ttacaggcgg
 ggtttttctt gttgacaaga atcctcacaat taccgcagag tctagactcg tgggtggactt 240
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 ggcgttttat catattccctc ttcatcctgc tgctatgcct catcttcttgc ttggttcttc 360
 tggactatca aggtatgttgc cccgtttgtc ctctaattcc aggatcctca accaccagca 420
 cgggaccatg ccgaacctgc acgactcctg ctcaaggaac ctctatgtat ccctccctgtt
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 ttttcttttgc tctttgggttacattttaa ccctaacaaa acgaaaagat ggggttactc 720
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 aaa 840
 <210> 23
 <211> 264
 <212> PRT
 <213> hepatitis B virus

55 <400> 23

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Glu Asp Trp Gly Pro Cys Ala Glu His Gly Glu His His Ile Arg Ile
 1 5 10 15

5 Pro Arg Thr Pro Ser Arg Val Thr Gly Gly Val Phe Leu Val Asp Lys
 20 25 30

10 Asn Pro His Asn Thr Ala Glu Ser Arg Leu Val Val Asp Phe Ser Gln
 35 40 45

15 Phe Ser Arg Gly Asn His Arg Val Ser Trp Pro Lys Phe Ala Val Pro
 50 55 60

20 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu
 65 70 75 80

25 Ser Leu Asp Val Ser Ala Ala Phe Tyr His Ile Pro Leu His Pro Ala
 85 90 95

30 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Ser Arg Tyr Val
 100 105 110

35 Ala Arg Leu Ser Ser Asn Ser Arg Ile Leu Asn His Gln His Gly Thr
 115 120 125

40 Met Pro Asn Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu
 130 135 140

45 Leu Leu Leu Tyr Gln Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His
 145 150 155 160

50 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser
 165 170 175

55 Pro Phe Leu Met Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg
 180 185 190

Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Val Asp Asp Val Val
 195 200 205

60 Leu Gly Ala Lys Ser Val Ser His Leu Glu Ser Leu Phe Thr Ala Val
 210 215 220

65 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Asn Lys Thr

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225	230	235	240
Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly Cys			
5	245	250	255
Tyr Gly Ser Leu Pro Gln Glu His			
260			
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<210> 24			
<211> 226			
<212> PRT			
15	<213> hepatitis B virus		
<400> 24			
Met Glu Asn Ile Thr Ser Gly Phe Leu Gly Pro Leu Leu Val Leu Gln			
20	1	5	10
15			
Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu			
25	20	25	30
Asp Ser Trp Trp Thr Ser Leu Ser Phe Leu Gly Glu Thr Thr Val Cys			
35 40 45			
30			
Leu Gly Gln Asn Ser Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser			
50 55 60			
Cys Pro Pro Thr Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe			
35	65	70	75
80			
Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu Val			
40	85	90	95
Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Ile Pro Gly			
45	100	105	110
Ser Ser Thr Thr Ser Thr Gly Pro Cys Arg Thr Cys Thr Thr Pro Ala			
115 120 125			
50			
Gln Gly Thr Ser Met Tyr Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp			
130 135 140			
Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Ala Lys			
55	145	150	155
160			

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Phe Leu Trp Glu Trp Gly Ser Ala Arg Phe Ser Trp Leu Ser Leu Leu
 165 170 175

5 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu
 180 185 190

10 Ser Val Met Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Arg Ile
 195 200 205

15 Leu Ser Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val
 210 215 220

20 Tyr Ile
 225

25 <210> 25
 <211> 560
 <212> DNA
 <213> hepatitis B virus

30 <400> 25
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 gtcctctact tccaggatct tcaaccacca gcacgggtcc atgcagaacc tgcacgactc 120

35 ctgctcaagg aacctctatg tatccctcat gttgctgtac caaacattcg gacggaaatt
 gcacctgtat tccccatccca tcatcctggg ctttcggaaa attcctatgg gagtggggcct 180

40 cccccattgt ttggcttca gttatgtgga tcatgtggta ttggggccca agtctgtatc
 gcatcttgag tccctttta ccgctgttac caattttctt ttgtctctgg gtatacattt 240

45 aaaccctcac aaaacaaaaa gatggggta ctcttacat ttcatggct atgtcatcg 300
 atgttatggg tctttgccac 360

50 <210> 26
 <211> 186
 <212> PRT
 <213> hepatitis B virus

55 <400> 26
 Asn Leu Ser Trp Leu Ser Leu Asp Val Ser Ala Ala Phe Tyr His Ile
 1 5 10 15

- 29 -

Pro Leu His Pro Ala Ala Met Pro His Leu Leu Val Gly Ser Ser Gly
 20 25 30

5 Leu Ser Arg Tyr Val Ala Arg Leu Ser Ser Thr Ser Arg Ile Phe Asn
 35 40 45

10 His Gln His Gly Ser Met Gln Asn Leu His Asp Ser Cys Ser Arg Asn
 50 55 60

15 Leu Tyr Val Ser Leu Met Leu Leu Tyr Gln Thr Phe Gly Arg Lys Leu
 65 70 75 80

20 His Leu Tyr Ser His Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met
 85 90 95

25 Gly Val Gly Leu Ser Pro Phe Leu Met Ala Gln Phe Thr Ser Ala Ile
 100 105 110

30 Cys Ser Val Val Arg Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr
 115 120 125

35 Val Asp Asp Val Val Leu Gly Ala Lys Ser Val Ser His Leu Glu Ser
 130 135 140

40 Leu Phe Thr Ala Val Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu
 145 150 155 160

45 Asn Pro His Lys Thr Lys Arg Trp Gly Tyr Ser Leu His Phe Met Gly
 165 170 175

Tyr Val Ile Gly Cys Tyr Gly Ser Leu Pro
 180 185

50 <210> 27
 <211> 160
 <212> PRT
 <213> hepatitis B virus

55 <220>
 <221> MISC_FEATURE
 <222> (160)..(160)
 <223> Xaa is any amino acid

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<400> 27

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	20	25	30	
10				
	Tyr Arg Gly Met Leu Pro Val Cys Pro Leu Leu Pro Gly Ser Ser Thr			
	35	40	45	
15				
	Thr Ser Thr Gly Pro Cys Arg Thr Cys Thr Thr Pro Ala Gln Gly Thr			
	50	55	60	
20				
	Ser Met Tyr Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp Gly Asn Cys			
	65	70	75	80
25				
	Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Gly Lys Phe Leu Trp			
	85	90	95	
30				
	Glu Trp Ala Ser Ala Arg Phe Ser Trp Leu Ser Leu Leu Val Pro Phe			
	100	105	110	
35				
	Val Gln Trp Phe Val Gly Leu Ser Pro Ile Val Trp Leu Ser Val Met			
	115	120	125	
40				
	Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Arg Ile Leu Ser Pro			
	130	135	140	
45				
	Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val Tyr Ile Xaa			
	145	150	155	160
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<211>	1029			
45	<212> DNA			
	<213> hepatitis B virus			
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	gctagatccc aragtgagrg gcctatactt tcctgtggg ggctccagtt ccggaacagt		180	
55	aaaccctgtt ccgactactg cctctcccat atcgtcaatc ttctcgagga ctggggaccc		240	
	tgcaccgaat atggagagca caacatcagg attccttagga cccctgtcg tggcacaggc		300	

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	ctccaatcac tcaccaacct ctgtcttcc aatttgcct ggttatcgct ggatgtgtct	480	
	gcggcggttt atcatcttcc ttttcatect gctgctatgc ctcatcttct tgkgttct	540	
10	tctggactac caaggatgt tgcccgtttgccttactt ccaggaacat caactaccag	600	
	cacgggacca tgcaagacat gcacgattcc tgctcaagga acctctatgt ttcccttgc	660	
15	ttgctgtaca aaaccccttcgg acggaaatttgcacttgcatttccatccat catcttggc	720	
	tttcgcaga ttccatggg agtgggcctc agtccgtttc ttctggtca gtttactagt	780	
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	aattttcttt tgcctttggg tatacatatata accctacta aaactaaacg ttggggctac	960	
25	tcccttaact tcatggata tgtaatttgc agttgggttgccttaccaca ggaacatatt	1020	
	gtacacaaa	1029	
30	<210> 29 <211> 268 <212> PRT <213> hepatitis B virus		
35	<400> 29 Glu Asp Trp Gly Pro Cys Thr Glu Tyr Gly Glu His Asn Ile Arg Ile		
	1 5 10 15		
40	Pro Arg Thr Pro Ala Arg Val Thr Gly Gly Val Phe Leu Val Asp Lys		
	20 25 30		
45	Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp Phe Ser Gln		
	35 40 45		
50	Phe Ser Arg Gly Ser Thr His Val Ser Trp Pro Lys Phe Ala Val Pro		
	50 55 60		
	Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu		
	65 70 75 80		
55	Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala		
	85 90 95		

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Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro Arg Tyr Val
 100 105 110
 5

Ala Arg Leu Ser Ser Thr Ser Arg Asn Ile Asn Tyr Gln His Gly Thr
 115 120 125
 10

Met Gln Asp Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu
 130 135 140

15 Leu Leu Leu Tyr Lys Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His
 145 150 155 160

20 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser
 165 170 175

25 Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg
 180 185 190

Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val
 195 200 205

30 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Phe Thr Ala Val
 210 215 220

35 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Thr Lys Thr
 225 230 235 240

40 Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly Ser
 245 250 255

45 Trp Gly Thr Leu Pro Gln Glu His Ile Val His Lys
 260 265

<210> 30
 <211> 226
 <212> PRT
 50 <213> hepatitis B virus

<220>
 <221> MISC_FEATURE
 <222> (95)..(95)
 55 <223> Xaa is any amino acid

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<400> 30

	Met	Glu	Ser	Thr	Thr	Ser	Gly	Phe	Leu	Gly	Pro	Leu	Leu	Val	Leu	Gln
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20 25 30

10	Asp	Ser	Trp	Trp	Thr	Ser	Leu	Asn	Phe	Leu	Gly	Gly	Ala	Pro	Thr	Cys
					35			40					45			

15 Pro Gly Gln Asn Leu Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser
50 55 60

20 Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe
65 70 75 80

Ile Ile Phe Leu Phe Ile Leu Leu Cys Leu Ile Phe Leu Xaa Val
25 85 90 95

Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Leu Pro Gly
100 105 110

30	Thr	Ser	Thr	Thr	Ser	Thr	Gly	Pro	Cys	Lys	Thr	Cys	Thr	Ile	Pro	Ala
					115			120			125					

35 Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp
130 135 140

40 Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Ala Arg
145 150 155 160

45 Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Leu Ser Leu Leu
165 170 175

Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu
180 185 190

50	Ser	Val	Ile	Trp	Met	Met	Trp	Tyr	Trp	Gly	Pro	Ser	Leu	Tyr	Asn	Ile
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210 215 220

Tyr Ile
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 <213> hepatitis B virus

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 15 tagatcccag agtgaggggc ctatacttcc ctgctggtgg ctccagttca ggaacagtaa
 acccctgttcc gactactgcc tctcccatat cgtaaatctt ctcgaggact ggggaccctg
 20 caccgaatat ggagagcacc acatcaggat tcctaggacc cctgctcgta ttacaggcgg
 gttttttttt gttgacaaga atccctcacaa taccacagag tctagactcg tggggactt
 ctctcaattt tctagggggc gcacccacgt gtcctggcca aaatttgcag tcccccaacct
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 ggcgttttat catcttcctc ttcatcctgc tgctatgcct catcttcttgc ttggttcttc
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 cgggaccatg caagacactgc acgatccctg ctcaaggaac ctctatgttt ccctttgtt
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 40 tgtggtattt gggccaaatgt ctgtacaaca tcttgaatcc ctttttaccg ctgttaccas
 ttttcttttgc tctttgggtt tacattttaaa ccctrctaaa accaaacgtt ggggttactc
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15 Gln His Ile Pro Pro Ser Ser Ala Arg Ser Gln Ser Glu Gly Pro Ile
 35 40 45

Leu Ser Cys Trp Trp Leu Gln Phe Arg Asn Ser Lys Pro Cys Ser Asp
 50 55 60

20 Tyr Cys Leu Ser His Ile Val Asn Leu Leu Glu Asp Trp Gly Pro Cys
 65 70 75 80

25 Thr Glu Tyr Gly Glu His His Ile Arg Ile Pro Arg Thr Pro Ala Arg
 85 90 95

30 Val Thr Gly Gly Val Phe Leu Val Asp Lys Asn Pro His Asn Thr Thr
 100 105 110

35 Glu Ser Arg Leu Val Val Asp Phe Ser Gln Phe Ser Arg Gly Ser Thr
 115 120 125

His Val Ser Trp Pro Lys Phe Ala Val Pro Asn Leu Gln Ser Leu Thr
 130 135 140

40 Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu Ser Leu Asp Val Ser Ala
 145 150 155 160

45 Ala Phe Tyr His Leu Pro Leu His Pro Ala Ala Met Pro His Leu Leu
 165 170 175

50 Val Gly Ser Ser Gly Leu Pro Arg Tyr Val Ala Arg Leu Ser Ser Thr
 180 185 190

55 Ser Arg Asn Ile Asn Tyr Gln His Gly Thr Met Gln Asp Leu His Asp
 195 200 205

Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu Leu Leu Tyr Lys Thr

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	210	215	220
5	Phe Gly Arg Lys Leu His Leu Tyr Ser His Pro Ile Ile Leu Gly Phe 225 230 235 240		
10	Arg Lys Ile Pro Met Gly Val Gly Leu Ser Pro Phe Leu Leu Ala Gln 245 250 255		
15	Phe Thr Ser Ala Ile Cys Ser Val Val Arg Arg Ala Phe Pro His Cys 260 265 270		
20	Leu Ala Phe Ser Tyr Met Asp Asp Val Val Leu Gly Ala Lys Ser Val 275 280 285		
25	Gln His Leu Glu Ser Leu Phe Thr Ala Val Thr Asn Phe Leu Leu Ser 290 295 300		
30	Leu Gly Ile His Leu Asn Pro Xaa Lys Thr Lys Arg Trp Gly Tyr Ser 305 310 315 320		
35	Glu Asn Phe Met Gly Tyr Val Ile Gly Ser Trp Gly Thr Leu Pro Gln 325 330 335		
40	Glu His Ile Val His Lys Ile Lys 340		
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			15

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Ser Pro Pro Leu Arg Asp Ser His Pro Gln Ala Met Gln Trp Asn Ser
 20 25 30

5 Ser Thr Phe His Gln Ala Leu Leu Asp Pro Arg Val Arg Gly Leu Tyr
 35 40 45

10 Phe Pro Ala Gly Gly Ser Ser Ser Gly Thr Val Asn Pro Val Pro Thr
 50 55 60

15 Thr Ala Ser Pro Ile Ser Ser Ile Phe Ser Arg Thr Gly Asp Pro Ala
 65 70 75 80

20 Pro Asn Met Glu Ser Thr Thr Ser Gly Phe Leu Gly Pro Leu Leu Val
 85 90 95

25 Leu Gin Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln
 100 105 110

Ser Leu Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Ala Pro
 115 120 125

30 Thr Cys Pro Gly Gln Asn Leu Gln Ser Pro Thr Ser Asn His Ser Pro
 130 135 140

35 Thr Ser Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg
 145 150 155 160

40 Arg Phe Ile Ile Phe Leu Phe Ile Leu Leu Cys Leu Ile Phe Leu
 165 170 175

Leu Val Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Leu
 180 185 190

45 Pro Gly Thr Ser Thr Ser Thr Gly Pro Cys Lys Thr Cys Thr Ile
 195 200 205

50 Pro Ala Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro
 210 215 220

55 Ser Asp Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe
 225 230 235 240

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Ala Arg Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Leu Ser
 245 250 255

5 Leu Leu Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val
 260 265 270

10 Trp Leu Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr
 275 280 285

15 Asn Ile Leu Asn Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu
 290 295 300

20 Trp Val Tyr Ile Xaa Thr Leu Leu Lys Pro Asn Val Gly Val Thr Pro
 305 310 315 320

25 Leu Thr Ser Trp Asp Met Xaa Leu Glu Val Gly Val Pro Tyr His Arg
 325 330 335

30 Asn Ile Leu Tyr Thr Lys Ser Asn
 340

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 <213> hepatitis B virus

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 tactttctg ctggtggtc cagttcagga acagttagcc ctgtcgaa tactgcctct 180
 gccatatcgt caaccttctc gaagactggg gaccctgtac cgaacatgga gaacatcgca 240
 tcaggactcc taggacccct gtcgcgtta caggcggggt tttctcggt gacaaaaatc 300
 45 ctcacaatac cacagagtct agactcgtgg tggacttctc tcaattttctt aggggaaaca 360
 cccgtgtgtc ttggccaaa ttgcgcgtcc caaatctcca gtcactcacc aacttgggt 420
 50 cctccaattt gtccctggta tcgctggatg tgtctgcggc gttttatcat ctccctctgc 480
 atccctgtgc tatgcctcat cttcttggtg gttttctgg actatcaagg tatgttgccc 540
 gtttgcgttc taattccagg atcatcaacc accagcaccc gaccatgcag aacctgcacg 600
 55 actcctgctc aaggaacccctc tatgtttccc tcatgttgct gtacaaaacc tacggacgga 660
 aactgcacccct gtattcccat cccatcatct tgggtttcg caaaataacct atgggagtgg 720

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gcctcagtcc gtttctttg gtcagtttca ctagtgcgt ttgttcagtg gtctcgtaggg 780
 ctcccccca ctgtctggct ttcagttata tggatgatgt ggtatgggg gccaagtctg 840
 5 tacaacatct ttagtccctt tatgccgtg ttaccaattt tctttgtct tgggtatac 900
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 10 ttgggggttg gggctccttg 980

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 <211> 258
 15 <212> PRT
 <213> hepatitis B virus

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 25 Pro Arg Thr Pro Ala Arg Val Thr Gly Gly Val Phe Leu Val Asp Lys
 20 25 30

 Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp Phe Ser Gln
 30 35 40 45

 Phe Ser Arg Gly Asn Thr Arg Val Ser Trp Pro Lys Phe Ala Val Pro
 50 55 60

 35 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu
 65 70 75 80

 40 Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala
 85 90 95

 45 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Ser Arg Tyr Val
 100 105 110

 50 Ala Arg Leu Ser Ser Asn Ser Arg Ile Ile Asn His Gln His Arg Thr
 115 120 125

 Met Gln Asn Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu
 130 135 140

 55 Met Leu Leu Tyr Lys Thr Tyr Gly Arg Lys Leu His Leu Tyr Ser His
 145 150 155 160

- 40 -

Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser
 165 170 175
 S

Pro Phe Leu Leu Ala Gin Phe Thr Ser Ala Val Cys Ser Val Val Arg
 180 185 190
 10 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val
 195 200 205

15 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Tyr Ala Ala Val
 210 215 220

20 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro His Lys Thr
 225 230 235 240

25 Lys Arg Trp Gly Tyr Ser Leu Gln Phe Met Gly Tyr Val Ile Gly Gly
 245 250 255
 Trp Gly

30 <210> 36
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 35 <213> hepatitis B virus
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40 Met Glu Asn Ile Ala Ser Gly Leu Leu Gly Pro Leu Leu Ala Leu Gln
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Ala Gly Phe Phe Ser Leu Thr Lys Ile Leu Thr Ile Pro Gln Ser Leu
 20 25 30

45 Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Thr Pro Val Cys
 35 40 45

50 Leu Gly Gln Asn Ser Gln Ser Gln Ile Ser Ser His Ser Pro Thr Cys
 50 55 60

55 Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe
 65 70 75 80

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	Ile Ile Phe Leu Cys Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu Val			
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5	Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Ile Pro Gly			
	100	105	110	
10	Ser Ser Thr Thr Ser Thr Gly Pro Cys Arg Thr Cys Thr Thr Pro Ala			
	115	120	125	
15	Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro Thr Asp			
	130	135	140	
20	Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Ala Lys			
	145	150	155	160
25	Tyr Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Leu Ser Leu Leu			
	165	170	175	
30	Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu			
	180	185	190	
35	Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Asn Ile			
	195	200	205	
40	Leu Ser Pro Phe Met Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val			
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45	Tyr Ile			
	225			
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	ttctctaggac cccttcttgt gttacaggcg gggttttct tggacaag aatcctcaca	180		
	ataccgcaga gtcttagactc gtgggtggact tctctcaatt ttcgaggggg aactaccgtg	240		
	tgtcttggcc aaaattcgca gtccccaaacc tccaatcact caccacccctc ctgtctcca	300		
	acttgtcctg gttatcgctg gatgtgtctg cggcgttta tcatmttctt cttcattctg	360		

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 gctcaaggaa cctctatgtt tccctcttgt tgctgtacca aacctacgga cggzaattgc 540
 acctgtatttc ccattccatc atcctgggtt ttccggaaaat tcctatggga gtgggcctca 600
 10 gcccgttcc cctggctcag ttactagtg ccatttgta agtggttcgt agggctttcc
 cccactgttt ggcttcagt tatatggatg atgtggattt gggggccaag tctgtaymgc 720
 15 atctttagtc ccttttacc gctgttacca attttctttt gtcttgggtt atacatttaa
 accctaacaa aacaagaga tggggtaact ctctgaattt tatgggttat gtcattggaa 780
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 50 Leu Ser Leu Ile Val Asn Leu Leu Glu Asp Trp Gly Pro Cys Ala Glu
 20 25 30
 His Gly Glu His His Ile Arg Ile Pro Arg Thr Pro Ser Arg Val Thr
 55 35 40 45

- 43 -

Gly Gly Val Phe Leu Val Asp Lys Asn Pro His Asn Thr Ala Glu Ser
 50 55 60

5 Arg Leu Val Val Asp Phe Ser Gln Phe Ser Arg Gly Asn Tyr Arg Val
 65 70 75 80

10 Ser Trp Pro Lys Phe Ala Val Pro Asn Leu Gln Ser Leu Thr Asn Leu
 85 90 95

15 Leu Ser Ser Asn Leu Ser Trp Leu Ser Leu Asp Val Ser Ala Ala Phe
 100 105 110

20 Tyr His Xaa Pro Leu His Pro Ala Ala Met Pro His Leu Leu Val Gly
 115 120 125

25 Ile Leu Xaa His Gln His Gly Thr Met Pro Asn Leu His Asp Tyr Cys
 145 150 155 160

30 Ser Arg Asn Leu Tyr Val Ser Leu Leu Leu Tyr Gln Thr Tyr Gly
 165 170 175

35 Arg Lys Leu His Leu Tyr Ser His Pro Ile Ile Leu Gly Phe Arg Lys
 180 185 190

40 Ile Pro Met Gly Val Gly Leu Ser Pro Phe Leu Leu Ala Gln Phe Thr
 195 200 205

45 Phe Ser Tyr Met Asp Asp Val Val Leu Gly Ala Lys Ser Val Xaa His
 225 230 235 240

50 Leu Glu Ser Leu Phe Thr Ala Val Thr Asn Phe Leu Leu Ser Leu Gly
 245 250 255

55 Ile His Leu Asn Pro Asn Lys Thr Lys Arg Trp Gly Tyr Ser Leu Asn
 260 265 270

Phe Met Gly Tyr Val Ile Gly Ser Tyr Gly Ser Leu Pro Gln Glu His

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275

280

285

5 Ile Ile Gln Lys Ile Lys Glu Cys Phe Arg Lys
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 20 25 30

40 Asn Met Glu Asn Ile Thr Ser Gly Phe Leu Gly Pro Leu Leu Val Leu
 35 40 45

45 Gln Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser
 50 55 60

50 Leu Asp Ser Trp Trp Thr Ser Leu Asn Phe Arg Gly Gly Thr Thr Val
 65 70 75 80

55 Cys Leu Gly Gln Asn Ser Gln Ser Pro Thr Ser Asn His Ser Pro Thr
 85 90 95

Ser Cys Pro Pro Thr Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg

- 45 -

	100	105	110
5	Phe Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu		
	115	120	125
10	Val Leu Leu Asp Tyr Xaa Gly Met Leu Pro Val Cys Pro Leu Ile Pro		
	130	135	140
15	Gly Ser Ser Xaa Thr Ser Thr Gly Pro Cys Arg Thr Cys Met Thr Thr		
	145	150	155
	Ala Gln Gly Thr Ser Met Tyr Pro Ser Cys Cys Cys Thr Lys Pro Thr		
	165	170	175
20	Asp Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Gly		
	180	185	190
25	Lys Phe Leu Trp Glu Trp Ala Ser Ala Arg Phe Ser Trp Leu Ser Leu		
	195	200	205
30	Leu Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp		
	210	215	220
35	Leu Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Xaa		
	225	230	235
	Ile Leu Ser Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp		
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55			180
			240

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	caatttctta ggggaaacta ccgtgtgtct tggccaaaat tcgcagtccc caacacctcaa	300
	tcaactcacca acctccgtc ctccaaacttg tcctgggtat cgctggatgt gtctgcggcg	360
5	tttatcatc ttccctttca tcctgctgtat atgcctcata tcctgttgg ttcttcgttga	420
	ctatcraggt atgttgcggcg ttgtccctat aattccagga tcctcaacca ccagcacggg	480
10	accatgccga acctgcgtga ctactgctca aggaacctct atgtatccct cctgttgcgt	540
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	aaaattcccta tgggagtgcccgttcttcgttgc ctcagtttac tagtgcatt	660
15	tgttcagtggttccgttagggc ttccccccac tgtttggctt tcagttatat ggatgtatgt	720
	gtattggggg ccaagtcgtgy acagcatctt gagtccctttt ttaccgcgggt gaccaatttt	780
20	cattttgtctt tgggtataaca tttaaacccctt aacaaaacaa agagatgggg ttactctctg	840
	aattttatgg gttatgtcat tggaaagttat gggtccttgc cacaagaaca catcatacaa	900
	aaaatcaaag aa	912
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	20 25 30	
45	Leu Glu Asp Trp Gly Pro Cys Ala Glu His Gly Glu His His Ile Arg	
	35 40 45	
50	Ile Pro Arg Thr Pro Ser Arg Val Thr Gly Gly Val Phe Leu Val Asp	
	50 55 60	
55	Lys Asn Pro His Asn Thr Ala Glu Ser Arg Leu Val Val Asp Phe Ser	
	65 70 75 80	

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Gln Phe Ser Arg Gly Asn Tyr Arg Val Ser Trp Pro Lys Phe Ala Val
 85 90 95

5 Pro Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp
 100 105 110

10 Leu Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro
 115 120 125

15 Ala Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Ser Arg Tyr
 130 135 140

20 Val Ala Arg Leu Ser Ser Asn Ser Arg Ile Leu Asn His Gln His Gly
 145 150 155 160

25 Thr Met Pro Asn Leu His Asp Tyr Cys Ser Arg Asn Leu Tyr Val Ser
 165 170 175

30 Leu Leu Leu Tyr Gln Thr Tyr Gly Arg Lys Leu His Leu Tyr Ser
 180 185 190

35 His Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu
 195 200 205

40 Ser Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val
 210 215 220

45 Arg Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val
 225 230 235 240

50 Val Leu Gly Ala Lys Ser Xaa Gln His Leu Glu Ser Leu Phe Thr Ala
 245 250 255

55 Val Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Asn Lys
 260 265 270

55 Thr Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly
 275 280 285

55 Ser Tyr Gly Ser Leu Pro Gln Glu His Ile Ile Gln Lys Ile Lys Glu
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 15 <223> Xaa is any amino acid

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 35 40 45

 35 Phe Leu Gly Pro Leu Leu Val Leu Gln Ala Gly Phe Phe Leu Leu Thr
 50 55 60

 40 Arg Ile Leu Thr Ile Pro Gln Ser Leu Asp Ser Trp Trp Thr Ser Leu
 65 70 75 80

 45 Asn Phe Leu Gly Gly Thr Thr Val Cys Leu Gly Gln Asn Ser Gln Ser
 85 90 95

 50 Pro Thr Ser Asn His Ser Pro Thr Ser Cys Pro Pro Thr Cys Pro Gly
 100 105 110

 55 Tyr Arg Trp Met Cys Leu Arg Arg Phe Ile Ile Phe Leu Phe Ile Leu
 115 120 125

 60 Leu Leu Cys Leu Ile Phe Leu Leu Val Leu Leu Asp Tyr Xaa Gly Met
 130 135 140

 65 Leu Pro Val Cys Pro Leu Ile Pro Gly Ser Ser Thr Thr Ser Thr Gly
 145 150 155 160

- 49 -

5 Pro Cys Arg Thr Cys Met Thr Thr Ala Gln Gly Thr Ser Met Tyr Pro
165 170 175

10 Ser Cys Cys Cys Thr Lys Pro Thr Asp Gly Asn Cys Thr Cys Ile Pro
180 185 190

15 Ile Pro Ser Ser Trp Ala Phe Gly Lys Phe Leu Trp Glu Trp Ala Ser
195 200 205

20 Ala Arg Phe Ser Trp Leu Ser Leu Leu Val Pro Phe Val Gln Trp Phe
210 215 220

25 Val Gly Leu Ser Pro Thr Val Trp Leu Ser Val Ile Trp Met Met Trp
225 230 235 240

30 Tyr Trp Gly Pro Ser Leu Xaa Ser Ile Leu Ser Pro Phe Leu Pro Arg
245 250 255

Pro Ile Phe Phe Cys Leu Trp Val Tyr Ile
260 265

30

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